Daniel J. Heinzen

Personal Data:

Born June 18, 1957, Willmar, Minnesota

Married to Dr. Jolene Kiolbassa

Education:

Ph. D., Physics, Massachusetts Institute of Technology, June, 1988. Thesis under Professor M. S. Feld: "Radiative Decay and Level Shift of an Atom in an Optical Resonator."

B. S., Physics, Massachusetts Institute of Technology, June 1981.

Augustana College, Sioux Falls, SD, Sept. 1975 - June 1977.

Professional Experience:

Professor of Physics, The University of Texas at Austin, Sept. 2000 - present.

Associate Professor of Physics, The University of Texas at Austin, Sept. 1996 – Aug. 2000.

Assistant Professor of Physics, The University of Texas at Austin, Jan. 1991 – Aug. 1996.

Postdoctoral Research Associate, Ion Storage Group, National Institute of Standards and Technology, Boulder, CO., Sept. 1988 - Dec. 1990.

Fellowships and Awards:

Fondren Centennial Foundation Chair in Physics, University of Texas, 2000 - present.

Fellow, American Physical Society, 1999 - present.

National Science Foundation National Young Investigator, 1992 - 1997.

Alfred P. Sloan Research Fellow, 1991 - 1993.

National Research Council Postdoctoral Fellow, 1988 - 1990.

Lester Wolfe Fellow, 1981 - 1988.

Professional Activities:

Fellow, American Physical Society; Member, Optical Society of America, American Association for the Advancement of Science.

Member, NSF Special Emphasis Panel on Manipulating Matter with Light, Feb. 1995.

Chair-Elect, Vice Chair, Chair, and Past Chair, 1995-99, American Physical Society Topical Group on Precision Measurement and Fundamental Constants.

Member, 1996 Quantum Electronics and Laser Science (QELS) Conference Program Committee.

Member, 12th Interdisciplinary Laser Science Conference Program Committee.

Member, NSF Review Panel, Optical Sciences and Engineering Initiative, Feb. 1996.

Chair, Program Committee, APS Topical Group on Precision Measurement and Fundamental Constants, Spring 1997.

Chair, Fellowship Committee, APS Topical Group on Precision Measurement and Fundamental Constants, Spring 1997.

Lecturer, International School of Physics "Enrico Fermi," Varenna, Italy, July 1998.

Member, Austrian Science Foundation Review Panel, Spezialforschungsbereich on "Control and Measurement of Quantum Systems," Innsbruck, Austria, Sept. 30 - Oct. 1, 1998.

Program Subcommittee Chair, 2000 Quantum Electronics and Laser Spectroscopy Conference.

Member, NSF Review Panel, MIT - Harvard Center for Ultracold Atoms, Mar. 2000.

Member, Editorial Board, *Review of Scientific Instruments*, 2001 - 2004.

Co-Organizer, Spring 2002 Les Houches Conference on Ultracold Molecules.

Member, Advisory Committee, MIT - Harvard Center for Ultracold Atoms, 2001 - present.

Program Committee Co-Chair, 2002 Quantum Electronics and Laser Spectroscopy Conference.

DAMOP Fellowship Committee, 2002.

Member, 2003 NSF AMOP Review Panel.

Organized Tutorial Session on “New Directions in Dilute Gas Bose-Einstein Condensation”, 2003 March Meeting of the American Physical Society.

General Program Co-Chair, 2004 International Quantum Electronics Conference.

Member, Program Committee, 2005 International Quantum Electronics Conference.

Member, Joint U. Colorado/NIST Review Panel for the Joint Institute for Laboratory Astrophysics, Boulder, CO, June 2006.

Research Interests:

Ultracold Atomic Sources and Collisions.

Quantum Gases and Quantum Emulation.

Atomic and Molecular Physics Tests of Fundamental Symmetries.

Daniel J. Heinzen

Publications

Refereed Publications.

1. D. J. Heinzen, J. E. Thomas, and M. S. Feld, "Coherent Ringing in Superfluorescence," Phys. Rev. Lett. **54**, 677-680 (1985).

2. I. L. Shumay, V. N. Zadkov, D. J. Heinzen, M. M. Kash, and M. S. Feld, "Observation of the Saturation Effect in Continuous-Wave Coherent Anti-Stokes Raman Spectroscopy of Liquid Nitrogen," Opt. Lett. **11**, 233-235 (1986) and Sov. Phys. Izvestia **50**, 1202-1205 (1986).

3. C. H. Holbrow, A. P. Ghosh, D. Heinzen, X. Zhu, W. W. Quivers, Jr., G. Shimkaveg, P. G. Pappas, J. E. Thomas, and M. S. Feld, "Complete Doppler Coverage in Laser Optical Pumping by Wall-Induced Velocity-Changing Collisions," Phys. Rev. A**34**, 2477-2479 (1986).

4. D. J. Heinzen, J. J. Childs, J. E. Thomas, and M. S. Feld, "Enhanced and Inhibited Visible Spontaneous Emission by Atoms in a Confocal Resonator," Phys. Rev. Lett. **58**, 1320-1323 (1987).

5. D. J. Heinzen and M. S. Feld, "Vacuum Radiative Level Shift and Spontaneous Emission Linewidth of an Atom in an Optical Resonator," Phys. Rev. Lett. **59**, 2623-2626 (1987).

6. D. J. Heinzen, J. J. Childs, and M. S. Feld, "Spectroscopic Measurements of Single-Atom Emission in an Optical Resonator," Spectrochimica Acta **45A**, 75-79 (1989).

7. J. J. Bollinger, D. J. Heinzen, Wayne M. Itano, S. L. Gilbert, and D. J. Wineland, "Test of the Linearity of Quantum Mechanics by RF Spectroscopy of the $^{9}Be^{+}$ Ground State," Phys. Rev. Lett. **63**, 1031-1034 (1989).

8. D. J. Wineland, J. C. Bergquist, J. J. Bollinger, W. M. Itano, D. J. Heinzen, S. L. Gilbert, C. H. Manney, and M. G. Raizen, "Progress at NIST Toward Absolute Frequency Standards Using Stored Ions," IEEE Trans. Ultrason. Ferroelec. Freq. Contr. **37**, 515-523 (1990).

9. Wayne M. Itano, D. J. Heinzen, J. J. Bollinger, and D. J. Wineland, "Quantum Zeno Effect," Phys. Rev. A**41**, 2295-2300 (1990).

10. D. J. Heinzen and D. J. Wineland, "Quantum-Limited Cooling and Detection of Radio Frequency Oscillations by Laser-Cooled Ions," Phys. Rev. A**42**, 2977-2994 (1990).

11. J. J. Bollinger, D. J. Heinzen, W. M. Itano, S. L. Gilbert, and D. J. Wineland, "A 303 MHz Frequency Standard Based on Trapped Be^{+} Ions," IEEE Trans. Instrum. Meas. **40**, 126-128 (1991).

12. D. J. Heinzen, J. J. Bollinger, F. L. Moore, Wayne M. Itano, and D. J. Wineland, "Rotational Equilibria and Low-Order Modes of a Non-Neutral Ion Plasma," Phys. Rev. Lett. **66**, 2080-2083 (1991); and, errata: Phys. Rev. Lett. **66**, 3087 (1991).

13. Wayne M. Itano, D. J. Heinzen, J. J. Bollinger, and D. J. Wineland, "Reply to 'Comment on the Quantum Zeno Effect", Phys. Rev. A**43**, 5168-5169 (1991).

14. D. J. Wineland, J. J. Bollinger, D. J. Heinzen, W. M. Itano, and M. G. Raizen, "Search for Anomalous Spin-Dependent Forces using Stored-Ion Spectroscopy," Phys. Rev. Lett. **67**, 1735-1738 (1991).

15. D. J. Wineland, J. J. Bollinger, W. M. Itano, F. L. Moore, and D. J. Heinzen, "Spin Squeezing and Reduced Quantum Noise in Spectroscopy," Phys. Rev. A**46**, R6797-R6800 (1992).

16. J. J. Bollinger, D. J. Heinzen, F. L. Moore, W. M. Itano, and D. J. Wineland, "Low-order Modes of an Ion Cloud in a Penning Trap," Phys. Scripta **46**, 282-284 (1992).

17. J. J. Bollinger, D. J. Heinzen, F. L. Moore, Wayne M. Itano, and D. J. Wineland, "Electrostatic Modes of Ion Trap Plasmas," Phys. Rev. A**48**, 525-545 (1993).

18. W. M. Itano, J. C. Bergquist, J. J. Bollinger, J. M. Gilligan, D. J. Heinzen, F. L. Moore, M. G. Raizen, and D. J. Wineland, "Quantum Projection Noise: Population Fluctuations in Two-Level Systems," Phys. Rev. A**47**, 3554-3570 (1993); and, erratum: Phys. Rev. A**51**, 1717 (1995).

19. J. D. Miller, R. A. Cline, and D. J. Heinzen, "Far Off-Resonance Optical Trapping of Atoms," Phys. Rev. A**47**, R4567-R4570 (1993).

20. J. D. Miller, R. A. Cline, and D. J. Heinzen, "Photoassociation Spectrum of Ultra-Cold Rb Atoms," Phys. Rev. Lett. **71**, 2204-2207 (1993).

21. R. A. Cline, J. D. Miller, M. R. Matthews, and D. J. Heinzen, "Spin Relaxation of Optically Trapped Atoms by Light Scattering," Opt. Lett. **19**, 207-209 (1994).

22. D. J. Wineland, J. J. Bollinger, W. M. Itano, and D. J. Heinzen, "Squeezed Atomic States and Projection Noise in Spectroscopy," Phys. Rev. A**50**, 67-88 (1994).

23. M. Bijlsma, B. J. Verhaar, and D. J. Heinzen, "Role of Collisions in the Search for an Electron Electric-Dipole Moment," Phys. Rev. A**49**, R4285-R4288 (1994).

24. R. A. Cline, J. D. Miller, and D. J. Heinzen, "Study of Rb_2 Long-Range States by High Resolution Photoassociation Spectroscopy," Phys. Rev. Lett. **73**, 632-635 (1994); and, errata: Phys. Rev. Lett. **73**, 2636 (1994).

25. J. R. Gardner, R. A. Cline, J. D. Miller, D. J. Heinzen, H. M. J. M. Boesten, and B. J. Verhaar, "Collisions of Doubly Spin Polarized, Ultracold ^{85}Rb Atoms," Phys. Rev. Lett. **74**, 3764-3767 (1995).

26. H. M. J. M. Boesten, C. C. Tsai, B. J. Verhaar, and D. J. Heinzen, "Observation of a Shape Resonance in Cold-Atom Scattering by Pulsed Photoassociation," Phys. Rev. Lett. **77**, 5194-5197 (1996).

27. J. J. Bollinger, Wayne M. Itano, D. J. Wineland, and D. J. Heinzen, "Optimal Frequency Measurements with Maximally Correlated States," Phys. Rev. A **54**, R4649-4652 (1996).

28. H. M. J. M. Boesten, C. C. Tsai, J. R. Gardner, D. J. Heinzen, and B. J. Verhaar, "Observation of a Shape Resonance in the Collision of Two Cold ^{87}Rb Atoms," Phys. Rev. A**55**, 636-640 (1997).

29. J. M. Vogels, C. C. Tsai, R. S. Freeland, S. J. J. M. F. Kokkelmans, B. J. Verhaar, and D. J. Heinzen, "Prediction of Feshbach Resonances in Collisions of Ultracold Rubidium Atoms," Phys. Rev. A **56**, R1067-1070 (1997).

30. C. C. Tsai, R. S. Freeland, J. M. Vogels, H. M. J. M. Boesten, B. J. Verhaar, and D. J. Heinzen, "Two-Color Photoassociation Spectroscopy of Ground State Rb_2," Phys. Rev. Lett. **79**, 1245-1248 (1997).

31. S. J. J. M. F. Kokkelmans, B. J Verhaar, K. Gibble, and D. J. Heinzen, "Predictions for Laser-Cooled Rb Clocks," Phys. Rev. A **56**, R4389-4392 (1997).

32. F. A. Van Abeelen, D. J. Heinzen, and B. J. Verhaar, "Photoassociation as a Probe of Feshbach Resonances in Cold-Atom Scattering," Phys. Rev. A **57**, R4102-4105 (1998).

33. D. J. Han, R. H. Wynar, Ph. Courteille, and D. J. Heinzen, "Bose-Einstein Condensation of Large Numbers of Atoms in a Magnetic Time-Averaged Orbiting Potential Trap," Phys. Rev. A **57**, R4114-4117 (1998).

34. Ph. Courteille, R. S. Freeland, D. J. Heinzen, F. A. van Abeelen, and B. J. Verhaar, "Observation of a Feshbach Resonance in Cold Atom Scattering," Phys. Rev. Lett. **81**, 69-72 (1998).

35. H. M. J. M. Boesten, C. C. Tsai, D. J. Heinzen, A. J. Moonen, and B. J. Verhaar, "Time-Independent and Time-Dependent Photoassociation of Spin-Polarized Rubidium, J. Phys. B **32**, 287-308 (1999).

36. G. Xu and D. J. Heinzen, "State Selective Rabi and Ramsey Magnetic Resonance Lineshapes," Phys. Rev. A **59**, R922-925 (1999).

37. Roahn Wynar, R. S. Freeland, D. J. Han, C. Ryu, and D. J. Heinzen, "Molecules in a Bose-Einstein Condensate," Science **287**, 1016 (2000).

38. J. M. Vogels, R. S. Freeland, C. C. Tsai, B. J. Verhaar, and D. J. Heinzen, "Coupled Singlet-Triplet Analysis of Two-Color Cold Atom Photoassociation Spectra," Phys. Rev. A **61**, 043047 (2000).

39. D. J. Heinzen, R. H. Wynar, P. D. Drummond, and K. V. Kheruntsyan, "Super-Chemistry: Coherent Dynamics of Coupled Atomic and Molecular Bose Condensates," Phys. Rev. Lett. **84**, 5029 (2000).

40. E. G. M. van Kempen, S. J. J. M. F. Kokkelmans, B. J. Verhaar, R. S. Freeland, D. Comparat, Roahn Wynar, and D. J. Heinzen, "Inter-Isotope Determination of Ultracold Rb Interactions from Three High-Precision Experiments," Phys. Rev. Lett. **88**, 093201 (2002).

41. P. D. Drummond, K. V. Kheruntsyan, and D. J. Heinzen, "Stimulated Raman Adiabatic Passage from and Atomic to a Molecular Bose-Einstein Condensate," Phys. Rev. A **65**, 063619 (2002).

42. Reply to "Comment on 'Stimulated Raman adiabatic passage from an atomic to a molecular Bose-Einstein condensate" P. D. Drummond, K. V. Kheruntsyan, D. J. Heinzen, and R. H. Wynar, Phys. Rev. A **71**, 017602 (2005)

43. T. Bergeman, J. Qi, D. Wang, Y. Huang, H. K. Pechkis, E. E. Eyler, P. L. Gould, W. C. Stwalley, R. A. Cline, J. D. Miller, and D. J. Heinzen, "Photoassociation of ^{85}Rb atoms into 0_u^+ states near the 5s + 5p atomic limits," J. Phys. B **39**, S813 (2006)

44. J. Liang, R. N. Kohn, Jr., M. F. Becker, and D. J. Heinzen, "High precision laser beam shaping using a binary-amplitude spatial light modulator," Appl. Opt. **29**, 1323 (2009).

45. J. Liang, R. N. Kohn, Jr., M. F. Becker, and D. J. Heinzen, "1.5% root-mean-square flat-intensity laser beam formed using a binary-amplitude spatial light modulator," Appl. Opt. **48**, 1955 (2009)

46. X. Du., S. Wan, E. Yesilada, C. Ryu, D. J. Heinzen, Z. Liang, and B. Wu, "Bragg Spectroscopy of a Superfluid Bose-Hubbard Gas," New. J. Phys. **12**, 083025 (2010).

Conference Reports and other Non-Refereed Publications

1. W. W. Quivers, Jr., R. A. Forber, A. P. Ghosh, D. J. Heinzen, G. Shimkaveg, M. A. Attili, C. Stubbins, P. G. Pappas, R. R. Dasari, M. S. Feld, Y. Niv, and D. E. Murnick, "Laser Optical Pumping in Atomic Vapors with Velocity Changing Collisions," in Laser Spectroscopy V, eds. A. R. W. McKellar, T. Oka, and B. P. Stoicheff (Springer-Verlag, Berlin, 1981) pp. 186-196.

2. D. J. Heinzen, J. E. Thomas, and M. S. Feld, "Experimental Studies of Transverse Effects in Superfluorescence," in Coherence and Quantum Optics V, eds. L. Mandel and E. Wolf (Plenum, New York, 1984) pp. 81-85.

3. D. J. Heinzen, J. E. Thomas, and M. S. Feld, "Coherent Ringing in Superfluorescence," in Laser Spectroscopy VII, eds. T. W. Hänsch and Y. R. Shen (Springer-Verlag, Berlin, 1985) pp. 290-291.

4. D. J. Heinzen, J. J. Childs, C. R. Monroe, and M. S. Feld, "Enhanced and Suppressed Visible Spontaneous Emission by Atoms in a Concentric Optical Resonator," in Laser Spectroscopy VIII, eds. W. Persson and S. Svanberg (Springer-Verlag, Berlin, 1987) pp. 36-38.

5. D. J. Wineland, J. C. Bergquist, J. J. Bollinger, W. M. Itano, D. J. Heinzen, S. L. Gilbert, C. H. Manney, and C. S. Weimer, "Progress at NIST Towards Absolute Frequency Standards Using Stored Ions," Proc. 43rd Annual Symposium on Frequency Control, Denver, June, 1989, IEEE Catalog no. 89CH2960-6, pp. 143-150.

6. D. J. Wineland, J. C. Bergquist, J. J. Bollinger, Wayne M. Itano, D. J. Heinzen, S. L. Gilbert, C. H. Manney, M. G. Raizen, and C. S. Weimer, "Progress at NIST on Absolute Frequency Standards Using Stored Ions," Proc. 4th European Frequency and Time Forum, March 1990.

7. D. J. Heinzen, J. J. Bollinger, W. M. Itano, S. L. Gilbert, and D. J. Wineland, "Test of the Linearity of Quantum Mechanics by RF Spectroscopy of the $^{9}Be^{+}$ Ground State," in Coherence and Quantum Optics VI, eds. J. H. Eberly, L. Mandel, and E. Wolf (Plenum, New York, 1990) pp. 479-481.

8. J. J. Bollinger, S. L. Gilbert, D. J. Heinzen, W. M. Itano, and D. J. Wineland, "Observation of Correlations in Finite, Strongly Coupled Ion Plasmas," in Strongly Coupled Plasma Physics, ed. S. Ichimaru (Elsevier Science Publishers/Yamada Science Foundation, Tokyo, 1990) pp. 177-187.

9. J. J. Bollinger, S. L. Gilbert, D. J. Heinzen, W. M. Itano, and D. J. Wineland, "Liquid and Solid Atomic Ion Plasmas," in Atomic Processes in Plasmas, eds. Y. Kim and R. Elton, (AIP Press, New York, 1990) pp. 152-162.

10. D. J. Wineland, W. M. Itano, J. C. Bergquist, J. J. Bollinger, W. M. Itano, D. J. Heinzen, C. H. Manney, F. L. Moore, M. G. Raizen, and C. S. Weimer, "Trapped-Ion Frequency Standards," Proc. 22nd Ann. Precise Time and Time Interval (PTTI) Applications and Planning Meeting, ed. R. L. Sydnor (NASA Conf. Publ. 3116, 1991), pp. 53-60.

11. J. J. Bollinger, D. J. Heinzen, Wayne M. Itano, S. L. Gilbert, and D. J. Wineland, "Atomic Physics Tests of Nonlinear Quantum Mechanics, in Atomic Physics 12, eds. J. C. Zorn and R. R. Lewis (AIP Press, New York, 1991) pp. 461-480.

12. D. J. Wineland, J. C. Bergquist, J. J. Bollinger, W. M. Itano, F. L. Moore, J. M. Gilligan, M. G. Raizen, D. J. Heinzen, C. S. Weimer, and C. H. Manney, "Recent Experiments on Trapped Ions at the National Institute of Standards and Technology," in Laser Manipulation of Atoms and Ions, eds. E. Arimondo, W. D. Phillips, and F. Strumia (North Holland, Amsterdam, 1992) pp. 553-567.

13. J. J. Bollinger, D. J. Heinzen, W. M. Itano, S. L. Gilbert, and D. J. Wineland "Atomic Physics Tests of Nonlinear Quantum Mechanics", in Foundations of Quantum Mechanics, eds. T. D. Black, M. M. Nieto, H. S. Pilloff, M. O. Scully, and R. N. Sinclair (World Scientific, Singapore, 1992) pp. 40-46.

14. J. J. Bollinger, D. J. Heinzen, F. L. Moore, C. S. Weimer, W. M. Itano, and D. J. Wineland, "Experimental Results on Normal Modes in Cold, Pure Ion Plasmas," in Strongly Coupled Plasma Physics, eds. H. M. Van Horn and S. Ichimaru (Univ. of Rochester Press, Rochester, NY, 1993) pp. 393-398.

15. W. M. Itano, J. C. Bergquist, J. J. Bollinger, J. M. Gilligan, D. J. Heinzen, F. L. Moore, M. G. Raizen, and D. J. Wineland, "Precise Spectroscopy for Fundamental Physics," Hyperfine Interactions **78**, 211-220 (1993).

16. W. M. Itano, J. C. Bergquist, J. J. Bollinger, J. M. Gilligan, D. J. Heinzen, F. L. Moore, M. G. Raizen, and D. J. Wineland, "Quantum Measurements of Trapped Ions," Vistas in Astronomy **37**, 169-183 (1993).

17. D. J. Heinzen, "Collisions of Ultracold Atoms in Optical Fields," in Atomic Physics 14, eds. D. J. Wineland, C. E. Wieman, and S. J. Smith (AIP Press, New York, 1995) pp. 369-388.

18. D. J. Heinzen, J. D. Miller, and R. A. Cline, "Photoassociation of Ultracold Atoms," in Spectral Lineshapes, Vol. 8, eds. A. David May, J. R. Drummond, and E. Oks (AIP Press, New York, 1995) pp. 420-421.

19. D. J. Heinzen, "Ultraprecise Measurements with NanoKelvin Temperature Atoms in a Microgravity Environment," Proc. 1996 NASA/JPL Microgravity Workshop, NASA Document D-13845 (1996), pp. 138-145.

20. J. J. Bollinger, D. J. Wineland, W. M. Itano, and D. J. Heinzen, "Spin Squeezing applied to Frequency Standards," Proceedings of the Fifth Symposium on Frequency Standards and Metrology (World Scientific, Singapore, 1996) pp.107-14.

21. D. J. Heinzen, "Ultracold Atomic Interactions and Bose-Einstein Condensation," Int. J. Mod. Phys. B **11**, 3297 (1997).

22. Ph. Courteille, D.-J. Han, R. H. Wynar, and D. J. Heinzen, "New observation of Bose-Einstein Condensation of ^{87}Rb Atoms in a Magnetic TOP trap," Proc. SPIE **3270**, 116-119 (1998).

23. D. J. Heinzen, "Ultracold Atomic Interactions," in Bose-Einstein Condensation, Proceedings of the Enrico Fermi Summer School on Bose-Einstein Condensation in Dilute Atomic Gases, Course CXL, Varenna, Italy, July 7-17, 1998, eds. M. Inguscio, S. Stringari, and C. E. Wieman (IOS Press, Amsterdam, 1999) pp. 351-390.

24. D. J. Heinzen, "Atomic Collisions at Sub-MicroKelvin Temperatures," in Atomic Physics 16, Proceedings of the 16th International Conference on Atomic Physics, Windsor, Ontario, Canada, Aug. 3-7, 1998, eds. W. E. Baylis and G. W. F. Drake (AIP Press, Woodbury, NY, 1999) pp.132-143.

Daniel J. Heinzen

Invited Presentations

1. "Laser Cooled Stored Ions: Solid Plasmas and Atomic Clocks," Physics Seminar, Lawrence Livermore National Laboratory, Livermore, CA, Jan. 20, 1989.

2. "Search for Nonlinearities in Quantum Mechanics and Anomalous Long Range Interactions using $^{9}Be^{+}$ NMR," Atomic Physics Seminar, The University of Texas, Austin, TX, Apr. 29, 1989.

3. "Testing Quantum Mechanics with Stored Ions," Physics Colloquium, The University of Rochester, Rochester, NY, Nov. 7, 1989.

4. "Testing Quantum Mechanics with Stored Ions," Atomic Physics Seminar, The University of Texas, Austin, TX, Nov. 17, 1989.

5. "Testing Quantum Mechanics with Stored Ions," Atomic Physics Seminar, Harvard University, Cambridge, MA, Jan. 5, 1990.

6. "Stored Ion Atomic Clock and Non-Neutral Plasma," Physics Colloquium, UCLA, Los Angeles, CA, Jan. 11, 1990.

7. "Testing Quantum Mechanics with Stored Ions," Atomic Physics Seminar, The University of Wisconsin, Madison, WI, Jan. 30, 1990.

8. "Testing Quantum Mechanics with Stored Ions," Modern Optics Seminar, MIT, Cambridge, MA, Feb. 13, 1990.

9. "Testing Quantum Mechanics with Stored Ions," Invited Talk, Foundations of Quantum Mechanics Workshop, Santa Fe, NM, May 31, 1990.

10. "Coupled Penning Trap Spectroscopy," Atomic Physics Seminar, The University of Washington, Seattle, WA, Sept. 4, 1990.

11. "Precise Measurements on Trapped Ions, Protons, and Electrons," Physics Colloquium, The University of Texas, Austin, TX, Sept. 26, 1990.

12. "Experiments at N.I.S.T. with Stored Ions," Invited Talk, Annual Meeting of the American Association for the Advancement of Science, Washington, DC, Feb. 19, 1991.

13. "Searching for an Electron Electric Dipole Moment using Trapped, Laser-Cooled Atoms," Atomic, Molecular, and Optical Physics Seminar, The University of Texas, Austin, TX, Dec. 13, 1991.

14. "Evolution of Atomic Coherences in Optical Dipole Potentials," Invited Talk, Crested Butte Workshop on Atomic Coherence and Interference in Quantum Optics, Crested Butte, CO, Sept. 17, 1992.

15. "Spin Squeezing and Reduced Quantum Noise in Spectroscopy," Invited Talk, XIIIth Moriond Workshop on Neutrinos, Atomic Physics, and Gravitation, Villars-sur-Ollon, Switzerland, Feb. 3, 1993.

16. "Laser-Cooled Atoms and the Search for Atomic T-Violation," Enrico Fermi Institute Seminar, The University of Chicago, Chicago, IL, Feb. 25, 1993.

17. "Optical Forces on Atoms," Invited Talk, Texas Instruments Central Research Laboratories, Dallas, TX, Mar. 25, 1993.

18. "Photoassociation and Light Scattering by Laser-Cooled, Trapped Atoms," Physics Colloquium, The University of Missouri, Columbia, MO, Mar. 29, 1993.

19. "Laser-cooled Atomic Point Sample," Invited Talk, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 6, 1993.

20. "Photoassociation Spectrum of Laser-Cooled Rb Atoms," Invited Talk, University of Oregon Chemical Physics Institute Annual Retreat, Charleston, OR, Sept. 23, 1993.

21. "Combining Atoms into Molecules with Laser Light," Atomic, Molecular, and Optical Physics Seminar, The University of Texas, Austin, TX, Jan. 28, 1994.

22. "Photoassociation of Ultracold Rb Atoms," Atomic and Molecular Physics Seminar, National Institute of Standards and Technology, Gaithersburg, MD, Feb. 4, 1994.

23. "Photoassociation of Ultracold Atoms," Atomic and Molecular Physics Seminar, Rice University, Houston TX, Mar. 3, 1994.

24. "Combining Atoms into Molecules with Photons," Physics Colloquium, The University of Texas, Austin, TX, Mar. 30, 1994.

25. "Photoassociation of Ultracold Atoms," Invited Talk, Annual Meeting of the Division of Atomic, Molecular and Optical Physics of the American Physical Society, Crystal City, VA, Apr. 21, 1994.

26. "High Resolution Photoassociation Spectroscopy," Invited Talk, 12th International Conference on Spectral Lineshapes, Toronto, Canada, June 17, 1994.

27. "Collisions of Ultracold Atoms in Optical Fields," Invited Talk, 14th International Conference on Atomic Physics, Boulder, CO, Aug. 5, 1994.

28. "Combining Atoms into Molecules with Laser Light," Invited Talk, Annual Meeting of the Optical Society of America, Dallas, TX, Oct. 7, 1994.

29. "The Low Energy Frontier in Atomic, Molecular, and Optical Physics," Invited Talk, Fall Meeting of the Texas Section of the American Physical Society, Austin, TX, Oct. 14, 1994.

30. "Combining Atoms into Molecules with Laser Light," Atomic Physics Seminar, The University of Connecticut, Storrs, CT, Oct. 20, 1994.

31. "The Low Energy Frontier in Atomic and Molecular Physics," Physics Club, Yale University, Oct. 21, 1994.

32. "Long Range Atomic Interactions and Cold Atom Physics," Atomic, Molecular, and Optical Physics Seminar, Harvard University, Cambridge, MA, Feb. 8, 1995.

33. "Atom Optics," Invited Talk, Central Texas Lasers and Electro-Optics Society Meeting, Austin, TX, Feb. 15, 1995.

34. "Physics of Ultracold, Trapped Atoms," Invited Talk, Spring Meeting of the Ohio Section of the American Physical Society, Youngstown, OH, May 12, 1995.

35. "Cooled Neutral Atoms - Collision Studies in a New Regime," Invited Talk, 19th International Symposium on Ion-Atom Collisions, Seattle, WA, Aug. 4, 1995.

36. "New Physics with Ultracold Atoms," Physics Colloquium, The University of Texas, Austin, TX, Sept. 6, 1995.

37. "New Physics with Ultracold Atoms," Physics Colloquium, Texas A&M University, College Station, TX, Nov. 11, 1995.

38. "Atomic Interactions at Nano-Kelvin Temperatures," Invited Talk, Workshop on Collective Effects in Ultracold Atomic Gases, Les Houches, France, April 2, 1996.

39. "Ultraprecise Measurements with NanoKelvin Temperature Atoms in a Microgravity Environment," Invited Talk, NASA/JPL Microgravity Low Temperature Workshop, Pasadena, CA April 10, 1996.

40. "Ultracold Atomic Interactions," Invited Talk, Inauguration Conference of the Asia Pacific Center for Theoretical Physics, Seoul, Korea, June 8, 1996.

41. "Probing Cold Atomic Collisions by Photoassociation," Atomic Physics Seminar, The University of Wisconsin, Madison, WI, July 1, 1996.

42. "Interactions between Ultracold Atoms," Invited Talk, 20th International Quantum Electronics Conference," Sydney, Australia, July 17, 1996.

43. "Shape Resonances and Interaction Parameters in Cold Rb Atom Scattering," Invited Talk, U.S. Workshop on Bose-Einstein Condensation, Boulder, CO, July 30, 1996.

44. "Cold Atomic Interactions and Bose-Einstein Condensation," Physics Colloquium, The University of Oregon, Eugene, OR, Oct. 17, 1996.

45. "EDM Measurements Using Cold Atoms," Invited Talk, NASA/JPL Microgravity Challenge Workshop, Rochester, NY, Oct. 19, 1996.

46. "Ultracold Atomic Collisions and Bose Condensation," Physics Colloquium, Eindhoven University of Technology, Eindhoven, The Netherlands, Oct. 31, 1996.

47. "Ultracold Atomic Collisions and Bose Condensation," Atomic Physics Seminar, Van der Waals - Zeeman Laboratorium, Universiteit van Amsterdam, Nov. 1, 1996.

48. "Bose-Einstein Condensation, and Prospects for an 'Atom Laser'," Theory Group "Brown Bag" Seminar, The University of Texas, Austin, TX, Feb. 27, 1997.

49. "Long-Range Atomic Interactions and Cold Atom Physics," Atomic Physics Seminar, National Institute of Standards and Technology, Gaithersburg, MD, Mar. 10, 1997.

50. "Precise Atomic Lifetimes and Interactions from Photoassociation Spectroscopy," Invited Talk, Annual Meeting of the Division of Atomic, Molecular and Optical Physics of the American Physical Society, Washington, DC, April 19, 1997.

51. "Precise Atomic Resonance Experiments with Ultracold Atoms in Microgravity," Invited Talk, NASA Fundamental Physics Workshop, Santa Barbara, CA, May 7, 1997.

52. "Interactions and Bose-Einstein Condensation of Ultracold Atomic Rb," Invited Talk, US/Japan Seminar on "Manipulation of Matter with Coherent Light," Kusatsu, Japan, Sept. 3, 1997.

53. "Bose-Einstein Condensation of Dilute, Interacting Rb Atoms," Physics Colloquium, The University of Washington, Seattle, WA, Oct. 6, 1997.

54. "Ultracold Atomic Collisions: Basic Interactions of Coherent Matter Wave Physics," Invited Talk, Optical Society of America Annual Meeting, Long Beach, CA, Oct. 14, 1997.

55. "Complete, Consistent Picture of Ultracold Rb Collision Phenomena," Invited Talk, Workshop on Collisions of Cold, Trapped Atoms, Boulder, CO, Nov. 11, 1997.

56. "Preparing Correlated States for Interferometric Measurement," Invited Talk, 28th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, Jan. 6, 1998.

57. "Laser Cooling, Bose-Einstein Condensation, and Atom Optics," Physics Seminar, Southwest Research Institute, San Antonio, TX, Feb. 2, 1998.

58. "Ultracold Atomic Interactions and Bose-Einstein Condensation," Seminar, Institute for Theoretical Physics, The University of California, Santa Barbara, CA, March 17, 1998.

59. "Quantum Control in a Finite, Anharmonic Ladder of States," Invited Talk, Workshop on Quantum Control of Atomic Motion II, The University of New Mexico, Albuquerque, NM, June 1, 1998.

60. "Feshbach Resonances, Bose-Einstein Condensation, and Coherent Quantum Control," Invited Talk, NASA/JPL Workshop on Fundamental Physics and Microgravity, Oxnard, CA, June 24, 1998.

61. "Interacting Atoms (and Molecules?) in a Bose-Einstein Condensate," Invited Talk, 14th International Conference on Spectral Lineshapes, State College, PA, June 26, 1998.

62. "Ultracold Atomic Interactions," Invited Lectures, International School of Physics "Enrico Fermi," Varenna, Italy, July 15-17, 1998.

63. "Atomic Collisions at Sub-MicroKelvin Temperatures," Invited Talk, 16th International Conference on Atomic Physics, Windsor, Ontario, Canada, Aug. 4, 1998.

64. "Quantum Control in a Finite, Anharmonic Ladder of States," Atomic Physics Seminar, The University of Michigan, Ann Arbor, MI, Aug. 10, 1998.

65. "Ultracold Atomic Collisions and BEC," Atomic Physics Seminar, European Laboratory for Laser Spectroscopy, Florence, Italy, Sept. 28, 1998.

66. "Ultracold Collision Resonances and Coherent Matter Wave Physics," Harvard-Smithsonian Center for Astrophysics/Harvard Dept. of Physics Joint Atomic Physics Colloquium, Cambridge, MA, Nov. 4, 1998.

67. "Quantum Control of Angular Momentum States," Seminar, Massachusetts Institute of Technology, Nov. 5, 1998.

68. "How to Improve the Bounds on Time-Reversal Symmetry Violation with Laser-Cooled Atoms," Atomic, Molecular, and Optical Physics Seminar, The University of Texas, Austin, TX, Nov. 6, 1998.

69. "How Atomic Collisions Affect a Bose-Einstein Condensate," Invited Talk, Annual Meeting of the American Association for the Advancement of Science, Anaheim, CA, Jan. 23, 1999.

70. "Stimulated Atom-Molecule Transitions in a Bose-Einstein Condensate," Invited Talk, Joint Institute for Laboratory Astrophysics Workshop on Bose-Einstein Condensation, Feb. 10-12, 1998.

71. "Stimulated Raman Atom-Molecule Transitions in a Bose-Einstein Condensate," Invited Talk, Workshop on Ultracold Collisions, Photoassociation, and Ultracold Molecule Formation, Les Houches, France, March 1-5 1999.

72. "Magnetic Resonance with a New Twist: Quantum Control of an Atomic Spin," Modern Optics and Spectroscopy Seminar, M.I.T., Cambridge, MA, Mar. 16, 1999.

73. Lecturer, Tutorial Session on "The Physics of Cold Atoms at Millikelvin, Microkelvin and Nanokelvin Temperatures," 1999 Centennial Meeting of the American Physical Society, March 21, 1999.

74. "Bose-Einstein Condensation and Cold Collisions," Invited Talk, ATMOP99, Annual Conference of the Atomic, Molecular, Optical and Plasma Physics Division of the UK Institute of Physics, Manchester, England, Mar. 29 - Apr. 1, 1999.

75. "How Atomic Collisions Affect a Bose-Einstein Condensate," Physics Colloquium, Penn State University, State College, PA, Apr. 21, 1999.

76. "Prospects for Precision Measurements with Trapped, Ultracold Atoms in Microgravity," Invited Talk, NASA/JPL International Conference on Fundamental Physics in Space, Washington, DC, May 1, 1999.

77. "Application of Quantum Control Theory to Manipulate the Zeeman States of an Atom," Invited Talk, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 23-28, 1999.

78. "Stimulated Raman Atom-Molecule Coupling in a Bose-Einstein Condensate," Invited Talk, ITAMP workshop on Trapping, Spectroscopy, and Collisions of Ultracold Molecules, Cambridge, MA, July 1-3, 1999.

79. "Photoassociation in a Bose-Einstein Condensate," Invited Talk, Atomic Physics Gordon Conference, Plymouth, NH, July 4-9, 1999.

80. "Combining Ultracold Atoms into Molecules," Invited Talk, Gordon Conference on Simple Systems in Chemistry and Physics, Newport, RI, July 11-16, 1999.

81. "Stimulated Molecule Formation in Atomic Bose-Einstein Condensates," Physics Colloquium, The University of Texas, Austin, TX, Sept. 24, 1999.

82. "Molecules in a Dilute Bose-Einstein Condensate," Physics Colloquium, The University of California, San Diego, CA, Oct. 21, 1999.

83. "Molecules in a Bose-Einstein Condensate," Physics Colloquium, The Pennsylvania State University, State College, PA, Nov. 15, 1999.

84. "Stimulated Molecule Formation in a Bose-Einstein Condensate," Bose-Condensation Seminar, National Institute of Standards and Technology, Gaithersburg, MD, Nov. 17, 1999.

85. "Molecules in a Bose-Einstein Condensate," Quantum Optics and Condensed Matter Group Seminar, The University of Toronto, Toronto, CA, Dec. 6, 1999.

86. “Molecules in a Dilute Gas Bose-Einstein Condensate,” Invited Talk, Joint ITAMP/RTC Workshop on Multi-Component and Spinor Bose-Einstein Condensates of Trapped Dilute Vapors, Rochester, NY, Jan. 9-11, 2000.

87. “Molecules in a Bose-Einstein Condensate,” Physics Colloquium, The University of Michigan, Ann Arbor, MI, Feb. 1, 2000.

88. “Molecules in a Dilute Gas Bose-Einstein Condensate,” Physics Colloquium, The University of Oregon, Eugene, OR, Feb. 7, 2000.

89. “Ultracold Molecule Formation in Bose-Einstein Condensates,” Invited Talk, Annual NASA Fundamental Physics Workshop, Solvang, CA, June 19-21, 2000.

90. “Molecules in a Bose-Einstein Condensate,” Invited Talk, Annual DAMOP Meeting of the American Physical Society, Storrs, CT, June 14-17, 2000.

91. “Atom-Molecule Coupling in a Bose-Einstein Condensate: a New Form of Chemistry?” Invited Talk, Ninth Annual International Laser Physics Workshop, Bordeaux, France, July 17-21, 2000.

92. “Molecules in a Bose-Einstein Condensate,” Invited Talk, Euroconference on Atom Optics and Interferometry, Cargèse, France, July 26-29, 2001.

93. “Molecules in a Dilute Gas Bose-Einstein Condensate,” Invited Talk, 220th Annual Meeting of the American Chemical Society, Washington, DC, Aug. 20-24, 2000.

94. “Molecules in a Dilute Gas Bose-Einstein Condensate,” Invited Talk, Research Meeting of the DOE BES AMOP Program, Warrenton, VA, Sept. 26-29, 2000.

95. “Interactions Between Molecules and an Atomic BEC,” Invited Talk, US-Japan Seminar: Coherent Quantum Systems, Newport, RI, Sept. 17-21, 2000.

96. “Molecules in a Bose-Einstein Condensate,” Invited Talk, Annual Meeting of the Optical Society of America, Providence, RI, Oct. 22-27, 2000.

97. “Molecules in a Dilute Gas Bose-Einstein Condensate,” P/T Colloquium, Los Alamos National Laboratory, Los Alamos, NM, Oct. 19, 2000.

98. “Molecules in a Dilute Gas Bose-Einstein Condensate,” Physics Colloquium, The Rowland Institute, Cambridge, MA, Nov. 13, 2000.

99. “Molecules in a Dilute Gas Bose-Einstein Condensate,” Seminar on Modern Optics and Spectroscopy, MIT, Cambridge, MA, Nov. 14, 2000.

100. “Molecules in a Bose-Einstein Condensate,” Physics Colloquium, University of Nevada, Las Vegas, NV, Feb. 16, 2001.

101. “Molecules in a Bose-Einstein Condensate,” Invited Talk, March Meeting of the American Physical Society, Seattle, WA, March 12-16, 2001.

102. “Molecules in a Bose-Einstein Condensate,” Invited Talk, Annual NASA Microgravity Workshop, Pasadena, CA, May 1-3, 2001.

103. “Molecule Formation in Bose-Einstein Condensates,” Invited Talk, Annual DAMOP Meeting of the American Physical Society, London, Ontario, Canada, May 15-19, 2001.

104. “Molecules in a Bose-Einstein Condensate,” Invited Talk, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 6-11, 2001.

105. “Raman Coupled Atom-Molecular Gas,” Invited Talk, 15th International Conference on Laser Spectroscopy, Snowbird, UT, June 10-15, 2001.

106. “Raman Coupled Atom-Molecular Gas,” Invited Talk, Eighth Rochester Conference on Coherence and Quantum Optics, Rochester, NY, June 13-16, 2001.

107. “Molecules in a Bose-Einstein Condensate,” Invited Talk, XXII International Conference on Photonic, Electronic, and Atomic Collisions, Santa Fe, NM, July 18-21, 2001.

108. “Molecules in a Bose-Einstein Condensate,” Physics Colloquium, The University of Maryland, College Park, MD, Nov. 16, 2001.

109. “Formation, Trapping, and Collisions of Ultracold Molecules,” Physics Seminar, National Institute of Standards and Technology, Boulder, CO, Feb. 2, 2002.

110. “Magnetic Trapping, Collisions, and Spectroscopy of Ultracold Molecules,” Invited Talk, Cold Molecules 2002: Ultracold Molecules and Bose-Einstein Condensation, Les Houches, France, March 3-8, 2002.

111. “Experiment to Measure the Electric Dipole Moment of the Electron,” Invited, Talk, 2002 NASA Workshop on Fundamental Physics in Space, Dana Point, CA, May 9-11, 2002.

112. “Experiments with Ultracold, Trapped Molecules,” Invited, Talk, 2002 International Conference on Atomic Physics, Cambridge, MA, July 28 – Aug. 2, 2002.

113. “Collision Experiments with Magnetically Trapped, Ultracold Molecules,” CCP6 Workshop on Interactions of Cold Atoms and Molecules, Durham, U.K. Sept. 19-22, 2002.

114. “Photoassociation in a Bose-Einstein Condensate”, Invited Talk, Laser Science 18, Orlando, FL, Sept. 29-Oct. 3, 2002.

115. “Coherent Production of Molecules in Bose-Einstein Condensates,” Plenary Lecture, 2003 Physics of Quantum Electronics Conference, Snowbird, Utah, Jan. 5-9, 2003.

116. “Production of Molecules from an Atomic Bose-Einstein Condensate,” Invited Talk, Annual Meeting of the American Association for the Advancement of Science, Denver, CO, Feb. 16, 2003.

117. “Ultracold Molecule Formation, Trapping, and Collisions,” Invited Seminar, Harvard-MIT Center for Ultracold Atoms, Feb. 25, 2003.

118. “Ultracold Atomic Interactions,” Tutorial Lecture, March Meeting of the American Physical Society, Austin, TX, March 2, 2003.

119. “Trapping and Collisions of Ultracold Molecules,” Invited Talk, Atomic Physics Gordon Conference, Tilton, NH June 15-20, 2003.

120. “Experiments with Trapped, Ultracold Molecules and Mott Insulator States,” Invited Talk, 16th International Conference on Laser Spectroscopy, Palm Cove, Australia, July 13-18, 2003.

121. “Ultracold Molecule Formation through Stimulated Recombination of Atoms,” Invited Talk, Gordon Conference on Quantum Control of Light and Matter, Mt. Holyoke College, South Hadley, MA, Aug. 3-8, 2003.

122. “Superfluid and Insulating States of a Bose Gas in an Optical Lattice,” Condensed Matter Seminar, University of Texas at Austin, Sept. 2, 2003.

123. “Ultracold Molecules and the Mott Insulator Phase Transition,” Physics Colloquium, The University of Connecticut, Storrs, CT, Nov. 14, 2003.

124. “Coherent Photoassociation of a Mott Insulator,” Invited Talk, FOCUS Center Workshop, The University of Texas at Austin, Feb. 6-7, 2004.

125. “Superfluid and Insulating States of a Bose Gas in an Optical Lattice,” Theory group seminar, Los Alamos National Laboratory, Nov. 4, 2004.

126. “Superfluid and Insulating States of a Bose Gas in an Optical Lattice,” Invited Talk, Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, Jan. 3-7, 2005.

127. “Superfluid, Insulating, and Mixed Atom-Molecular states of Bosonic Atoms in an Optical Lattice,” AMO Physics Seminar, Rice University, April 4, 2005.

128. “Atom-Molecular Oscillations of a Bose Gas in an Optical Lattice,” Invited Talk, Annual DAMOP Meeting of the American Physical Society, Lincoln, Nebraska, May 17-21, 2005.

129. “Atomic and Molecular Quantum Gas in an Optical Lattice,” Invited “Hot Topics” Talk, International Conference on Laser Spectroscopy, Cairngorms National Park, Scotland, June 19-24, 2005.

130. “Raman Photoassociation of a Mott Insulator,” Invited Talk, Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, Jan. 3-6, 2006.

131. “Raman-Induced Oscillation Between an Atomic and a Molecular Gas”, Invited Talk, US-Japan Joint Seminar on Fundamental Issues and Applications of Ultracold Atoms and Molecules, Breckenridge, CO, Aug. 23-25, 2006.

132. “Raman-Induced Oscillation Between an Atomic and a Molecular Quantum Gas,” Invited Talk, Annual Meeting of the Optical Society of America, Rochester, NY, Oct. 8-12, 2006.

133. “Bosons, Lattices, and Quantum Simulation,” Center for Advanced Studies Seminar, The University of New Mexico, Albuquerque, NM, Nov. 8, 2007.

134. “Homogeneous Optical Lattice,” DARPA Optical Lattice Emulator Workshop, Newport, RI, Oct. 9-12, 2007.

135. “Spectroscopy of Atoms in an Optical Lattice,” Quantum Atom Optics Down Under 2007, Wollongong, Australia, Dec. 3-6, 2007.